

the same tables represent the observations before and after 1864 with equal accuracy.

These are the facts with which observation furnishes us. I leave my readers to draw their own inferences.

See *Monthly Notices* 1894 December.

The Transit of Mercury, 1804 November 10, observed in New South Wales. By H. C. Russell, B.A., F.R.S.

The morning was fine and clear, except a slight haziness. Unfortunately, the Sun was so situated that, viewed from the large equatorial, it was behind the Time-ball Tower. I was therefore obliged to use a very fine 6-inch equatorial by Sir Howard Grubb, which occupies the north dome. This telescope defines admirably, and was for the occasion reduced by a diaphragm to 3 inches. A reflecting prism was used to reduce the light still more, and a power of 120. When the Sun was clear of lower mists, I began to observe the planet carefully. It was remarkably black compared with the Sun-spots, quite round, and fairly well defined. During the whole time I saw no white spot on the planet, or anything to mar its blackness, and there was no surrounding ring or fringe of light. Examined closely, it was seen that at short intervals definition became bad, the apparent vibration producing an ill-defined edge. The rays of the Sun were powerful, and its heating effect no doubt gave rise to currents of unequal temperature, and as these passed before the telescope the planet's limb seemed to be rippling, as if waves were passing over it. As the planet approached the Sun's limb the narrow space between seemed to throw these conditions into prominence, and it became evident, when the planet got within one-third of its diameter (estimated) of the Sun's limb, that the contacts were not to be observed under favourable conditions. A moment of bad definition came on, in which the ripples seemed to form dents in the limbs of planet and Sun from 1" to 2" wide, and suddenly a shady ligament joined the limbs of planet and Sun. It was darker near the planet than the Sun's limb, and seemed to be made up of soft shaded lines from limb to limb, making up a band about one-quarter of the planet's diameter wide. This lasted two or perhaps three seconds, and then disappeared, the definition having suddenly improved. The time at which the ligament formed was November 10, 19^h 16^m 18^s.5. The greater darkness of the ligament near *Mercury* would result from the planet being darker than the sky, and its vibrations would obviously make a darker shading than that caused by the overlapping in vibrations of the darkness outside the Sun's limb. The space between the planet and Sun's limb now became quite clear and free from dark shading, until 19^h 16^m 18^s.5, when

Jan. 1895.

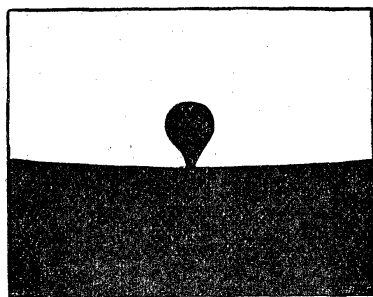
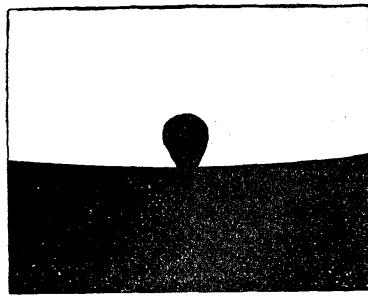
Mercury, 1894 November 10.

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suddenly a wave of bad definition formed the ligament again ; but the limbs were quite evidently not tangential, and did not seem to me to be so until $19^{\text{h}} 16^{\text{m}} 29^{\text{s}}.55$, when I recorded "*Contact of limbs. Internal contact complete.*" I then looked carefully to see if the planet's limb could be seen outside the Sun, but I saw no sign of this ; and at external contact the definition was rather better than it had been, and I noted $19^{\text{h}} 18^{\text{m}} 4^{\text{s}}.85$ as the time of last contact.

Mr. G. D. Hirst, who has erected a private observatory about a mile and a half west of Sydney Observatory, has kindly sent me a copy of his observations made with a $3\frac{3}{4}$ -inch equatorial of 5 feet focus and good defining power : aperture reduced to $2\frac{1}{2}$ inches, and magnifying power 100. He says :

"I send herewith two drawings of the black drop seen in the transit of *Mercury* this morning, November 10. These will, I think, be interesting, on account of the black drop phenomena which interfered materially with a satisfactory record of internal

Formation of drop at $7^{\text{h}} 16^{\text{m}} 22^{\text{s}}.9$ S.M.T.Appearance of drop 6^s later.

contact. The drop was totally unlike the phenomenon seen by me at Woodford in 1874 through the finder of the photoheliograph during the transit of *Venus*. That was a fuzzy, ill-defined stalk connecting the limbs of *Venus* and the Sun. This morning *Mercury* appeared to bulge out towards the Sun's limb, and the outline of this drop when formed was perfectly sharp ; and I recorded the time of the formation and apparent contact at $19^{\text{h}} 16^{\text{m}} 22^{\text{s}}.93$ S.M.T. ; and the time of watch was verified immediately afterwards by the transits of *Regulus* and χ *Crucis*. External contact at egress was noted at $19^{\text{h}} 18^{\text{m}} 2^{\text{s}}$, but this was not very reliable. I used the small aperture for two reasons : first, because I was afraid a larger one would break the coloured glass ; and secondly, I wanted to see if a small aperture had anything to do with the formation of the drop ; and I am now strongly inclined to think it has. Definition was moderately good, at times inferior."

Sydney Observatory :
1894 November 11.

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Mean Areas and Heliographic Latitudes of Sun-spots in the year 1892, deduced from Photographs taken at the Royal Observatory, Greenwich, at Dehra Dûn (India), and in Mauritius.

(Communicated by the Astronomer Royal.)

The results here given are in continuation of those printed in the *Monthly Notices*, vol. liv., p. 130, and are deduced from the measurements of solar photographs taken at the Royal Observatory, Greenwich, at Dehra Dûn, India, and at the Royal Alfred Observatory, Mauritius.

Table I. gives the mean daily areas of umbræ, whole spots, and faculæ for each synodic rotation of the Sun in 1892, and Table II. gives the same particulars for the entire year 1892 and for the three preceding years for the sake of comparison. The areas are given in two forms. First, projected areas—that is to say, as seen and measured on the photographs—these being expressed in millionths of the Sun's apparent disc; and next, areas as corrected for foreshortening, the areas in this case being expressed in millionths of the Sun's visible hemisphere.

Table III. exhibits for each rotation in 1892 the mean daily area of whole spots, and the mean heliographic latitude of the spotted area, for spots north and for spots south of the equator, together with the mean heliographic latitude of the entire spotted area, and the mean distance from the equator of all spots; and Table IV. gives the same information for the year as a whole, similar results for 1889, 1890, and 1891 being added as in the case of Table II. Tables II. and IV. are thus in continuation of the similar tables for the years 1874 to 1888 on pp. 381 and 382 of vol. xlix. of the *Monthly Notices*.

The rotations in Table I. and Table III. are numbered in continuance of Carrington's series ("Observations of Solar Spots made at Redhill," by R. C. Carrington, F.R.S.), No. 1 being the rotation commencing 1853 November 9. The assumed prime meridian is that which passed through the ascending node at mean noon on 1854 January 1, and the assumed period of the Sun's sidereal rotation is 25·38 days. The dates of the commencement of the rotations are given in Greenwich Civil Time, reckoning from mean midnight.